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INTEGRATED FLAMELESS DISTRIBUTED COMBUSTION/STEAM
REFORMING MEMBRANE REACTOR FOR HYDROGEN PRODUCTION AND USE
THEREOF IN ZERO EMISSIONS HYBRID POWER SYSTEM

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ABSTRACT OF THE DISCLOSURE

Disclosed is a new process and apparatus for steam reforming of any vaporizable hydrocarbon to produce H₂ and CO₂, with minimal CO, and no CO in the H₂ stream, using a membrane steam reforming (MSR) reactor and flameless distributed combustion (FDC) which provides great improvements in heat exchange efficiency and load following capabilities to drive the steam reforming reaction. The invention also pertains to a zero emission hybrid power system wherein the produced hydrogen is used to power a high-pressure molten carbonate fuel cell. In addition, the design of the FDC-MSR powered fuel cell makes it possible to capture good concentrations of CO₂ for sequestration or use in other processes.